REMARKS

Applicant respectfully requests reconsideration and allowance of all pending claims.

I. Status of the Claims

Claims 1-107 remain pending in the present application. No amendments have been made herein.

II. Claim Rejections Under 35 U.S.C. §103(a)

Reconsideration is requested of the rejection of claims 1-107 as being obvious over Holder (U.S. 5,588,993) in view of Kamio et al. (U.S. 5,087,429).

A. Claim 1

Claim 1 is directed to a process for preparing a silicon melt in a crucible from which a single crystal silicon ingot is grown for use in growing the single crystal silicon ingot by the Czochralski method, the process comprising:…

> c. feeding additional ***unmelted*** polycrystalline silicon into the rotating crucible ***by intermittently delivering*** the additional unmelted polycrystalline silicon out of a feed tube in the crucible and onto the exposed portion of the unmelted polycrystalline silicon of said partially melted charge in the crucible from which the single crystal silicon ingot is grown, the intermittent delivery comprising a plurality of ***alternating on-periods and off-periods***,…

The Holder reference teaches feeding unmelted polycrystalline silicon continuously into a crucible in order to prepare a melt. The Holder process involves forming the complete melt in this manner, and then initiating the pulling of the crystal. During the pulling, the level in the melt naturally decreases until the melt is depleted and the crystal

is completed. In other words, the pulling of the crystal essentially empties the crucible.

In contrast, the Kamio et al. process involves continuous crystal pulling and simultaneous silicon replenishment to maintain a constant liquid level in the melt. The replenishment method involves continuous feeding of granular polycrystalline silicon. The purpose of maintaining a constant liquid level is to yield a single crystal having dopant and oxygen concentrations which are substantially constant in the pull direction.

The Office's rejection of claim 1 over the combination of Holder and Kamio et al. is legally deficient because: (1) the combination of references is not motivated because the processes described in each reference are fundamentally unrelated, (2) the combination of references is not motivated because intermittent feeding and continuous feeding are not equivalent techniques, and (3) the combination of references fails to teach or suggest all of the claim limitations.

1. The combination of references is not motivated because the processes described in each reference are fundamentally unrelated.

First of all, the processes of Holder and Kamio et al. are fundamentally unrelated such that the person of ordinary skill looking to improve Holder's process would not be motivated to combine it with any aspect of Kamio et al.'s process. As mentioned above, Holder describes a method for continuously feeding granular polycrystalline silicon to form a melt. The melt is completed, i.e., the entire charge is added to the crucible and completely melted, before beginning the single crystal silicon ingot growth process. See Col. 7, lines 11-17 of Holder where Holder states, "After the feeding of granular-

polycrystalline silicon 40 is complete, the feed tube 42 can be positioned away from the center of the crucible 20 to allow for crystal pulling."

Kamio et al. describe a process for continuous feeding of granular silicon during crystal growth to maintain a constant liquid level in the crucible during pulling of the single crystal ingot. Kamio et al. only mention intermittent feeding methods in their background as alternative methods for maintaining a constant liquid level in the crucible, which significantly, "have not been put in practical use due to their technical difficulties encountered." Col. 2, lines 10-11.

The person of ordinary skill in the art attempting to improve a process like Holder's process which does not maintain constant liquid levels by replenishment would not see any reason to employ Kamio et al.'s continuous feeding method or, for that matter, the intermittent feeding method. In fact, one skilled in the art working with a continually depleting melt such as Holder's is concerned with creating a melt which is to be depleted. He is not concerned with creating a melt and then maintaining a constant liquid level therein. Accordingly, there is no motivation to combine Holder with any aspect of Kamio et al.'s replenishment process in view of the inapposite fundamental nature of the operations: forming a melt to be depleted (Holder) versus maintaining a melt to be continually replenished and kept at a constant liquid level (Kamio et al.).

Moreover, neither Holder nor Kamio et al. disclosed any particular reason to change Holder's continuous feeding of granular polycrystalline silicon to an intermittent feeding method. Holder was motivated to provide a method for forming a silicon melt in a crucible from which a single crystal silicon ingot can be pulled with improved zero defect yield. See Holder's abstract. Holder accomplished his goal by continuously

feeding granular polycrystalline silicon to the crucible at a relatively slow rate. The relatively slow feed rate allows for long residence time of granular polycrystalline silicon on an unmelted island of silicon in the crucible so that the granular polycrystalline silicon can dehydrogenate. See Col. 5, lines 31-53 and Col. 6, lines 3-11. In Holder's case, there would have been no motivation to periodically shut off feed because the person of ordinary skill would not understand that periodically shutting off the feed would provide any benefit.

Holder already teaches that to achieve acceptable dehydrogenation, the feed rate must be relatively slow, Col. 5, lines 31-53 and Col. 6, lines 3-11. If anything, from a practical commercial standpoint in which throughput is an important consideration, the person of ordinary skill would understand that periodically shutting down the feed could result in an even slower feed rate, slower than the feed rate Holder disclosed as sufficient to achieve acceptable dehydrogenation.

Kamio et al. provided no reason to substitute Holder's continuous feeding method with an intermittent feeding method. Kamio et al.'s continuous feeding of granular polycrystalline silicon or intermittent feeding of melted silicon during the single crystal silicon ingot growth process maintain constant the liquid level in a melt during the single crystal ingot pulling process. By maintaining a constant melt level, as opposed to allowing the melt to deplete, the concentration of oxygen and dopants in the growing crystal can be maintained relatively constant. See Col. 1, lines 42-50. Both continuous feeding and intermittent feeding methods disclosed in Kamio et al. are sufficient for Kamio et al's goal of improving the oxygen and dopant concentrations. Kamio et al., however, provided no particular reason to employ an intermittent feeding technique over the continuous feeding technique. Therefore, the

person of ordinary skill in the art would not have found any reason in the disclosure of Kamio et al. to change Holder's continuous feeding method to an intermittent feeding method.

Applicant, *for the first time*, discloses a method of intermittent feeding of unmelted polycrystalline silicon. Moreover, applicant, *for the first time*, discovered and disclosed a reason for intermittent feeding. Specifically, applicant discovered that intermittent feeding, that is, periodically stopping feeding, can actually increase the overall feeding rate and decrease the time needed to achieve a complete melt. This is counter-intuitive. To illustrate applicant's counter-intuitive discovery, see applicant's Examples 1 and 2, especially paragraph [0065], which show that intermittent feeding reduced the total feed time to "about half the time required for a continuous feeding process."

Finally, Kamio et al. provided no motivation to the person of ordinary skill in the art to choose intermittent feeding because the reference is simply not directed to intermittent feeding. In contrast to the Office's assertion on page 7 of the Office Action mailed 2/3/2006 that "…Kamio's broad teaching applied to intermittently feeding…," Kamio et al. <u>never</u> mention intermittent feeding after Col. 2, line 11 in their specification. If anything, Kamio et al. only discussed intermittent feeding in the background to disparage it. See Col. 2, lines 10-11. The Office's insistence that Kamio et al.'s broad teaching is directed to intermittent feeding broadly is legally deficient as contrary to the MPEP's mandate that:

> **VI. PRIOR ART MUST BE CONSIDERED IN ITS ENTIRETY, INCLUDING DISCLOSURES THAT TEACH AWAY FROM THE CLAIMS**
>
> A prior art reference must be considered in its entirety, i.e., <u>as a whole</u>, including portions that would lead away from the claimed invention. *W.L. Gore*

& Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied,* 469 U.S. 851 (1984). MPEP 2141.03 Part VI. (Emphasis added.)

To further illustrate Kamio et al.'s "as a whole" teaching toward continuous feeding of granular polycrystalline silicon, see the following sections of their disclosure:

Col. 4, lines 23-25, "The following difficulties will be encountered if a single crystal is pulled while continuously and directly feeding granular silicon into a crucible..."

Col. 4, lines 49-50, "...a method and apparatus for manufacturing silicon single crystals by continuously feeding silicon starting material in granular or small lump form into a crucible..."

Col. 7, lines 24-25, "The feeder 13 is connected to a starting material feed chamber (not shown) arranged externally of the chamber 8 thereby continuously feeding granular silicon 16 to the material feeding section B..."

Col. 8, lines 8-10, "During the interval, the granular silicon 16 is fed continuously from the feeder 13 onto the surface of the melt in the material feeding section B..."

Col. 8, lines 55-57, "...the material feeding section B must be higher than the melting point of silicon by at least more than 12°C as shown in FIG. 5 in order to pull a sound silicon single crystal 5 while preventing the continuously fed granular silicon 16 from causing solidification..."

Col. 11, lines 15-17, "...in order that a sound silicon single crystal is pulled while preventing the occurrence of solidification of the melt due to

continuously fed granular silicon..."

Col. 12, line 6-10, "...sound silicon crystals can be pulled by virtue of its construction that a crucible is divided into inner and outer sections by partition means to continuously feed granular silicon onto the surface of a melt in the material feeding section..."

Applicant does not wish to belabor the point any more than is necessary, but it is clearly legally deficient to assert that Kamio et al.'s broad teaching is to intermittent feeding when the discussion of intermittent feeding is limited to a passing reference in the background section and *the entire remaining disclosure* is directed to continuous feeding. Significantly, even Kamio et al. thought that their invention was limited to continuous feeding because they included in both of their independent claims 1 and 3 a requirement for "...means for continuously feeding silicon starting materials... ."

2. The combination of references is not motivated because intermittent feeding and continuous feeding are not equivalent techniques.

Second, the Office's assertion that it would have been obvious to modify Holder by using intermittent feeding because Kamio et al. show that intermittent feeding is a "known equivalent technique" is legally deficient.

The Office has asserted that intermittent feeding and continuous feeding are known equivalents. The Office stated on page 3 in the Office Action mailed 2/3/2006 that "...there are only two types of flow, intermittent and continuous, as evidenced by Kamio et al. and the selection of *one known equivalent technique for another may be obvious* even if the prior art does not expressly suggestion [sic] the substitution, *Ex Parte Novak*... ." This is legally deficient because there is

no technical support for the assertion that the feeding methods are equivalent, and the *Ex Parte Novak* decision does not provide the legal support for a conclusion that the two methods are equivalent.

First of all, there is no technical support for the Office's assertion that the feeding methods are equivalent. Contrary to the Office's assertion, Kamio et al. do not show that the feeding methods are equivalent. They only show that both feeding techniques may be used to feed melted silicon into a melt to maintain a constant liquid level. Kamio et al. are silent as to the technical effects of each feeding method, beyond the disparaging comment in Col. 2, lines 10-11. The Office appears to base its conclusion of technical equivalence on the mere citation by Kamio et al. of the two feeding methods as applicable to maintaining the liquid level in a melt.

This is legally deficient because merely stating that both methods are *applicable* does not support a conclusion that they are *equivalent*. In fact, applicant's intermittent feeding of unmelted polycrystalline silicon is superior to the known continuous feeding method. According to *The American Heritage® Dictionary of the English Language, Fourth Edition*, an "equivalent" is "something that is essentially equal to another." As an adjective, "equivalent" means "having similar or identical effects." Accordingly, if intermittent feeding and continuous feeding were equivalent, then they would be essentially equal to each other and have similar or identical effects. They do not. In fact, intermittent feeding is superior to continuous feeding. A person of ordinary skill with the benefit of the disclosure of Holder would recognize that there is a tradeoff between throughput, i.e., the amount of time required to form a melt, and quality, i.e., producing improved zero defect yield crystals. Holder's continuous feeding method

necessitates a relatively low feed rate (low throughput) to achieve improved zero defect yield (high quality). Of course, Holder may increase feed rate (high throughput), but at a cost of lowering the zero defect yield (low quality). Holder chose to lower the feed rate of the continuous feed method. By lowering throughput, Holder achieves an improved zero defect yield. Holder's decision was logical: although a faster throughput is desirable, it is non-productive to produce crystals having higher defect yields, since semiconductor manufacturing requires high quality wafers from high quality single crystal ingots.

Applicant's improved intermittent feeding technique is not as burdened by Holder's tradeoff between throughput and quality. Not only can applicant's feeding method improve the zero defect yield (high quality), but *it can do so at a faster rate* (high throughput). For this reason alone, applicant's intermittent feeding method is clearly superior to Holder's continuous feeding method.

Secondly, there is no legal support for the assertion that the feeding methods are equivalent. The Office stated that Kamio et al. show that the methods are equivalent and cited *Ex parte Novak* on pages 3 and 8 of the Office action for the proposition that "...the selection of one known equivalent technique for another may be obvious even if the prior art does not expressly suggestion [sic] the substitution."

Although the Office has stated the holding of *Ex parte Novak* correctly, that decision is inapposite to the present situation on its facts. In *Ex parte Novak*, the "known equivalent techniques" were known. In other words, the steam stripping technique for treating ground coffee and the partial evaporation technique for treating ground coffee at issue in the case were disclosed in the prior art. The *Novak* references

explicitly discussed the techniques, and the person of ordinary skill in the art could understand, from the references, that the techniques were both applicable for removing volatiles from ground coffee.

This is not the case here because prior to applicant's invention, claim 1's *intermittent* feeding of *unmelted* polycrystalline silicon was unknown. Holder discloses continuous feeding of unmelted polycrystalline silicon. As admitted by the Office on page 3, "Holder et al does [sic] not teach intermittent feeding." Kamio et al. disclose intermittent or continuous feeding of melted silicon and continuous feeding of unmelted granular polycrystalline silicon. Neither reference discloses applicant's feeding method, so his method cannot fairly be said to be "known." Since the feeding method is unknown, the burden remains on the Office to provide some reason, such as a discussion of the benefits of applicant's method in a prior art reference, why the feeding techniques are equivalent.

The Office asserted on page 8 of the Office action that applicant "admit[ted] that both continuous and intermittent feed methods can be used to achieve the same feed rate…therefore intermittent and continuous feed methods are equivalent and a person of ordinary skill in the art would have found it obvious to select either." This statement in the prior Amendment D is not admission that the techniques are equivalent. Although it is possible to achieve identical feed rates using the continuous and intermittent feeding method, it should be apparent from the above discussion that this does not show that the feed methods are equivalent. As explained above, at identical feed rates, the intermittent feeding method is superior to the continuous feeding method because the intermittent feed method results in improved zero defect yields compared to the continuous feeding

method. To achieve improved zero defect yields in the continuous feeding method of Holder, the feed rate must be relatively slow, which is disadvantageous from a practical commercial standpoint. That is, the lower feed rate necessary to achieve improved zero defect yields comes at the cost of lower throughput. Applicant's superior intermittent feeding method allows for both faster feed rates <u>and</u> improved zero defect yields.

3. The combination of references fails to teach or suggest all of the claim limitations.

Applicant's claim 1 is further patentable because the combination of references fails to teach or suggest every claim 1 limitation. Applicant's claim 1 was amended in prior Amendment D to clarify that the feeding is "feeding additional **<u>unmelted</u>** polycrystalline silicon into the rotating crucible **<u>by intermittently delivering</u>** the additional **<u>unmelted</u>** polycrystalline silicon..." This amendment underscores an additional distinction between applicant's feeding method and the feeding methods disclosed by Holder and Kamio et al. Specifically, the combination of references does not disclose "feeding additional unmelted polycrystalline silicon…by intermittently delivering…"

Holder does not teach intermittent feeding of unmelted polycrystalline silicon, as conceded by the Office on Page 2 of the Office Action mailed 7/26/2005 and again on Page 3 of the Office Action mailed 2/3/2006.

The Kamio et al. reference fails to correct this deficiency because it discloses intermittent feeding of ***melted*** silicon. The Kamio et al. reference is cited by the Office as disclosing intermittent feeding of silicon, in Cols. 1 and 2 of Kamio et al. In fact, Kamio et al. refer to the Japanese Laid-Open

Patent No. 56-164097 as disclosing intermittent feeding. The disclosure of this Laid-Open patent is further detailed in Col. 2, lines 3-11, where it is stated that the

> ...single crystal pull apparatus equipped with a ***molten*** material feeder whereby...a powdered sample is temporarily stored ***and melted*** in the forward end of the powdered feed tube thereby ***intermittently supplying the molted*** material into a crucible....

Accordingly, neither Holder nor Kamio et al. disclose "feeding additional ***unmelted*** polycrystalline silicon...by intermittently delivering..." as required by applicant's claim 1.

The foregoing literal distinctions between the respective processes are not simply semantic. Rather, they are germane to the fundamental contrasting goals achieved by the respective processes:

> applicant's intermittent feeding directly onto the melt to "decrease the amount of time required to prepare a fully molten silicon melt compared to a continuous feeding method" Applicant's specification; paragraph 28.

versus

> Kamio et al.'s [more correctly Laid-Open Patent No. 56-164097] intermittent feeding of molten silicon "...so as to maintain constant the liquid level of the molten material." Kamio et al., Col. 1, lines 55-63.

Moreover, the advantages afforded by intermittent feeding are explained in applicant's specification (paragraph [0046]):

> Experimental results to date suggest that the intermittent feeding process can significantly shorten the feed time compared to a continuous feed process by depositing polycrystalline silicon on the entire exposed unmelted polycrystalline silicon prior to redepositing granular polycrystalline on any wedge.

4. Claim 1 is patentable.

In view of all of the foregoing, the Office has failed to

establish its *prima facie* case of obviousness because: (1) the combination of references is not motivated because the processes described in each reference are fundamentally unrelated, (2) the combination of references is not motivated because intermittent feeding and continuous feeding are not equivalent techniques, and (3) the combination of references fails to teach or suggest all of the claim limitations. Accordingly, applicant requests withdrawal of the rejection and allowance of claim 1.

B. The Remaining Claims are Patentable

Claims 2-107, like claim 1, either require or depend from a claim which requires feeding additional unmelted polycrystalline silicon into the rotating crucible by intermittently delivering the additional unmelted polycrystalline silicon. These claims are patentable over the cited combination for the reasons stated above in connection with claim 1, and by virtue of the additional requirements therein. Specifically, there is no motivation to combine the references to achieve the invention defined by the claims, and the combination of Holder and Kamio et al. fails to teach or suggest the requirement of feeding additional unmelted polycrystalline silicon. Accordingly, applicant requests withdrawal of the rejections.

1. Claims 19-31

Regarding claims 19-31, these claims define parameters f, t_{on}, and t_{off}. The Office asserted on page 5 of the Office Action that "…the amount of time for commencing and stopping the flow and the flow rate of silicon are result effective variable [sic], which control the thickness of the unmolten layer. It would have been obvious to a person of ordinary skill in the art…to modify the combination of [references] by optimizing these parameters to obtain same by conducting routine

experimentation (MPEP 2144.05)." According to the relevant Federal Circuit case law, a parameter or variable must be recognized in the prior art before it can be asserted that the variable is result effective or can be optimized by conducting routine experimentation:

> …see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon ***what is already generally known*** provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.");… . MPEP 2144.05 Part II (emphasis provided).

In *Peterson*, a *prima facie* obviousness rejection of claims directed to an alloy was upheld over a prior art reference which disclosed an alloy having the same components, wherein the reference's disclosed ranges of wt. % of each component encompassed the claims ranges of wt.% of each component. Accordingly, the person of ordinary skill in the art, in the *Peterson* case, knew the claimed alloy components and generally the wt. % of each component from the prior art reference.

The threshold recognition, "what is generally known," of the variables described in claims 19-31 is not met in applicant's case because neither Holder nor Kamio et al. recognized the parameters. The Office conceded on page 5 of the Office Action, "the combination of Holder and Kamio et al. is silent to the value of…" the parameters claimed in claims 19-31.

Additionally, the variables in claims 19-31 are unknown in the prior art because the cited references do not even disclose intermittent feeding of unmelted polycrystalline silicon. Since neither the method itself nor the parameters of that method were recognized in the prior art, the person of ordinary skill was provided no guidance with which to optimize their values. Accordingly, the claims are non-obvious, and applicant requests withdrawal of the rejection.

2. **Claims 36-52**

Regarding claims 36-52, these claims are directed to intermittently feeding unmelted polycrystalline silicon onto a wedge. The Office asserted on page 6 of the Office Action, "...the combination of Holder and Kamio et al. teach rotating at a similar rate and flowing granular silicon intermittently, as applicant, therefore this is inherent to the combination... ." This rejection is legally deficient because it contravenes the standard for inherency rejections. For the claimed wedge feature to be deemed to be inherent, the Office must establish by fact or technical reasoning why it is *necessary* that the combination of references would inherently disclose the claimed wedge features:

> The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (***reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art***); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. ***Inherency, however, may not be established by probabilities or possibilities***. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' "

> In relying on the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic <u>necessarily</u> flows from the teaching of the applied prior art. (MPEP 2112 (citing Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990))). (MPEP 2112, emphasis added).

With regard to the wedge size, this depends, not only on the factors cited by the examiner, but on all of the following factors:

(1) rotation rate of the crucible

(2) the location of the feed pipe relative to the center of the unmelted polysilicon, such that as the unmelted polysilicon exits the feed pipe it lands on unmelted silicon in the crucible

(3) the direction of flowing unmelted polysilicon as it leaves the opening of the feed pipe

(4) the angle of repose valve

(5) the intermittent flow method

(6) the flow rate while the polysilicon is allowed to flow, f

(7) the duration of the on-periods, t_{on}

(8) the duration of the off-periods, t_{off}.

The Office has conceded the lack of disclosure of at least variables (6) through (8). See page 5 of the Office Action mailed 2/3/2006. Since the variables were not disclosed, the size of the wedges can only be established through "probabilities and possibilities," and the Office can only show that the wedge shapes "...may result from a given set of circumstances..." in the prior art. This is expressly forbidden according to the inherency standard outlined in *In re Oelrich*.

Moreover, with respect to variables (6) through (8), the Office on page 5 of the Office Action asserted that these variables could be achieved "...by optimizing these parameters...by conducting routine experimentation." However, according to *In re Rijckaert*, inherency rejections cannot be based on optimization of conditions but on what is necessarily present in the cited art. Accordingly, the Office's assertion that the

parameters described in claims 19-31 can be optimized by routine experimentation is a concession that the wedge shape requirements of claims 36-52 are not *necessarily* present in the cited art under the inherency standard outlined in *Rijckaert*. In other words, even if the parameters in claims 19-31 could be optimized using routine experimentation, it follows that claims 36-52 cannot be obvious because an inherency rejection cannot be based on optimization of conditions, but on what was necessarily present in the prior art.

Additionally, the Office cites MPEP §2144.04 Parts IV.A. and IV.B for the proposition that the wedge angle is merely the size of the wedge and that changes in size and shape are held to be obvious. These sections of the MPEP are inapposite to this case because these sections deal with scaling up or design considerations.

Moreover, MPEP §2144.04 Part IV.B states:

> ***B. Changes in Shape***
> *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966) (The court held that the configuration of the claimed disposable plastic nursing container was a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed container was significant.).

Accordingly, the MPEP states that a change in shape could be patentable if the configuration is significant. In this case, the size of the wedge is significant. As explained by applicant in paragraph [0046] by controlling the size of the wedge, "the intermittent feeding process can significantly shorten the feed time compared to a continuous feed process…" These shortened feed times are exemplified by applicant in Examples 1 and 2.

3. Claims 53-58

Regarding claims 53-58, these claims are directed to the positions of the wedges. As explained above in connection with claims 36-52, the combination of references does not inherently disclose the positions of the wedges because they do not disclose several of the factors which contribute to the wedge positions.

4. Claims 68-96

Claims 68-96, all require feeding additional unmelted polycrystalline silicon intermittently and "...forming a depleted molten silicon charge in the rotating crucible from which the single crystal silicon ingot is grown..." There is no motivation to combine the references to achieve the process defined by claims 68-96 because the references are directed to fundamentally different processes for forming a silicon melt. The Kamio et al. process teaches simultaneous pulling and replenishing, so that it is desirable to "maintain constant the liquid level of the molten material." The Holder process involves completing a melt, removing the feed pipe, then pulling a crystal; so there is no simultaneous pulling and replenishing. Because the Kamio et al. reference refers to intermittent feeding only as a way in which others had achieved a) constant liquid levels, in b) a simultaneous pulling and replenishing operation, there is no motivation to modify the Holder process by incorporating this intermittent feature. Holder's process does *not* employ constant liquid levels, *nor* does it involve simultaneous pulling and replenishing.

CONCLUSION

In view of the foregoing, applicant respectfully requests allowance of claims 1-107.

Respectfully submitted,

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